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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,058	10/02/2003	Hans J. Coufal	ARC920010095US2	3398

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EXAMINER	
STULTZ, JESSICA T	

ART UNIT	PAPER NUMBER
2873	

DATE MAILED: 04/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/679,058	COUFAL ET AL.	
	Examiner	Art Unit	
	Jessica T Stultz	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *32-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *35-45* is/are allowed.

6)☒ Claim(s) *32-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Banton et al in view of Marom et al.

Regarding claim 32, Banton et al discloses a method of transforming a beam of electromagnetic radiation (Column 2, lines 43-65, wherein the electromagnetic radiation is the high intensity collimated radiation from the laser diode "12", Figure 2), comprising: providing at least one optical element that includes a first and a second aspherical, non-planar, non-reentrant surface (Column 2, lines 43-67, wherein the first aspheric surface is "26" of lens element "25" and the second aspheric surface is "28" of lens element "27", wherein the radius of the surfaces changes monotonically and therefore the surfaces are non-reentrant, Figure 2); directing an input optical beam of substantially non-uniform intensity onto the first surface (Column 2, lines 43-67, wherein the laser diode "12" produces a beam having a Gaussian intensity profile "18", and therefore is non-uniform, Figures 2-3); and transforming substantially all of the input beam into an output beam that propagates away from the second surface (Column 2, line 61-Column 3, line 37, wherein the light beam "18" is converted into a flat intensity beam "24", Figures 2-3), the aspherical surfaces selected to perform the transforming (Column 2, line 61-Column 4, line 24, wherein the aspherical lens system "22", including aspheric surfaces "26" and "28", transforms

the Gaussian beam "18" into flat uniform intensity beam "24", Figures 2-3), wherein the output beam includes a central region over which the optical intensity is substantially uniform (Column 3, lines 12-37, wherein the central region of the output beam "24" is uniform, Figures 2-3), the central region including the region including most of the optical power in the output beam (Shown in Figures 2-3), wherein the intensity of the output beam outside the region varies gradually (Column 3, lines 12-37, wherein the lens elements are modified to produce slightly curved edges, Figures 2 and 4) but does not specifically disclose that the intensity profile of the input beam is expressible as a first function of a first coordinate times a second function of a second coordinate, wherein the first and second coordinates are independent of each other or that the intensity of the output beam outside the region varying gradually for the purpose of substantially reducing diffraction effects. It is inherent that the intensity of the output beam outside the central region varies gradually for the purpose of reducing diffraction effects, this being reasonably based upon the purpose of the curved peaked edges of Banton et al being to compensate for the effects of edge fall-off and to keep the amount of light reflected constant, thereby reducing diffraction effects (Column 3, lines 12-37). Regarding the input optical beam profile, it is well known in the art of lasers that a Gaussian profile of a laser beam is represented by an intensity profile expressed by a first function of a first coordinate times a second function of a second coordinate, the first and second coordinates being independent of each other as taught by Marom et al for the purpose of providing the intensity distribution of an on-axis Gaussian beam propagating at an angle θ with respect to the propagation axis (Column 5, line 61-Column 42, wherein the Gaussian intensity distribution of a laser is disclosed in Equation 3, wherein the function I(r,w) is represented by two functions, dependent on the two cylindrical

independent coordinates "r" and "w"). Therefore it would have been obvious for the Gaussian beam of Banton et al to have an input beam with an intensity profile expressed as a first function of a first coordinate times a second function of a second coordinate, the first and second coordinates being independent of each other since Marom et al teaches of a laser beam with represented by a Gaussian intensity profile expressed by a first function of a first coordinate times a second function of a second coordinate, the first and second coordinates being independent of each other for the purpose of providing the intensity distribution of an on-axis Gaussian beam propagating at an angle θ with respect to the propagation axis.

Regarding claim 33, Banton et al further discloses that the at least one optical element includes a first and a second optical element, each of the first and second optical elements having at least one aspherical, non-planar, non-reentrant surface, (Column 2, lines 43-67, wherein the first aspheric surface is "26" of lens element "25" and the second aspheric surface is "28" of lens element "27", wherein the radius of the surfaces changes monotonically and therefore the surfaces are non-reentrant, Figure 2) the method further comprising aligning the first and second optical elements along an optical axis (Shown in Figure 2, wherein the lens elements "25" and "27" are aligned along an optical axis).

Regarding claim 34, Banton et al and Marom et al disclose and teach of a method as shown above, however, Banton does not specifically disclose that intensity of the output beam varies gradually specifically for the purpose of reducing diffraction effects or that the intensity profile of the input beam include first and second orthogonal spatial coordinates. It is inherent from Banton et al that the intensity of the output beam outside the region varies gradually for the purpose of reducing diffraction effect, this being reasonably based upon the purpose of the

curved peaked edges of Banton et al being to compensate for the effects of edge fall-off and to keep the amount of light reflected constant, thereby reducing diffraction effects (Column 3, lines 12-37). Regarding the first and second coordinated being orthogonal spatial coordinate Marom et al further teaches that the coordinates, specifically "r" and "z" are orthogonal spatial components since "r" is a measure of the radial distance of the waist of the beam, taken along the "x" and "y" axes, from the axis of propagation "z", and therefore the coordinates are orthogonal for the purpose of providing the intensity distribution of an on-axis Gaussian beam propagating at an angle θ with respect to the propagation axis (Column 5, line 61-Column 6, line 42, Shown in Figure 1). Therefore it would have been obvious for the method of Banton et al to further include the intensity profile of the input beam including first and second orthogonal spatial coordinates since Marom et al further teaches that the coordinates are orthogonal, specifically "r" and "z" are orthogonal spatial components since "r" is a measure of the radial distance of the waist of the beam, taken along the "x" and "y" axes, from the axis of propagation "z", and therefore the coordinates are orthogonal for the purpose of providing the intensity distribution of an on-axis Gaussian beam propagating at an angle θ with respect to the propagation axis.

Allowable Subject Matter

Claims 35-45 allowed.

The following is an examiner's statement of reasons for allowable subject matter: none of the prior art alone or in combination disclose or teach of the claimed combination of limitations to warrant a rejection under 35 USC 102 or 103.

Specifically regarding independent claim 35, none of the prior art alone or in combination disclose or teach of a method of designing an optical system for transforming a first optical beam

to a second optical beam as disclosed using two aspherical, non-planar, non-reentrant surfaces, specifically including the step of constructing ray-tracing functions for first and second spatial coordinates and calculating sag values the aspherical surfaces expressed as a sum of the contribution depending on the first and second coordinates, respectively.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ngoi et al, Noethen, and Brunsting are cited as having some similar structure to the claimed invention. Specifically Ngoi et al discloses a method of transforming a laser beam using two aspheric surfaces and Noethen and Brunsting are cited to shown Gaussian intensity profiles of lasers dependent on two functions as is well known in the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessica T Stultz whose telephone number is (571) 272-2339. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jessica Stultz
Patent Examiner
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April 7, 2004

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